Detecting Ocean Surface Winds Using TRMM Precipitation Radar

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Although designed specifically for the measurement of precipitation in the atmosphere, the Precipitation Radar (PR) onboard the Tropical Rainfall Measuring Mission (TRMM) satellite also measures the normalized radar cross-section at the Earth's surface. As such, this instrument provides an interesting opportunity to explore an alternative radar configuration in the satellite remote sensing of ocean winds. In particular, it can measure the strength of the ocean winds in relatively higher spatial resolution as compared to the conventional scatterometer systems presently in use. The addition of wind sensing capability to precipitation radar also complements its rain profiling capability nicely and allows coincident wind and rain measurements. In this paper, we discuss the new ocean wind algorithm developed specifically for TRMM PR using maximum likelihood estimation. A unique feature of this wind algorithm is its capability to incorporate measurement sensitivity and noise information consistently in both the along-track and cross-track directions. This PR wind algorithm has been tested using data from the TRMM Microwave Imager (TMI) and NASA QuikSCAT scatterometer. Excellent agreement on the retrieved wind strengths is achieved among three sensors.

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